

## The Department of Energy in the FY 2003 Budget

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### HIGHLIGHTS

- As it did last year, the Bush Administration is again calling for cuts in the Department of Energy's (DOE) R&D budget, although this time by a smaller amount. Total DOE R&D funding would fall 0.5 percent to \$8.3 billion (see Table II-11), compared to 2.5 percent in the FY 2002 request.
- But overall, the White House would boost DOE spending by 2.7 percent, raising the Department's total to \$21.9 billion. Funded mostly through the Energy and Water Development appropriations bill, the DOE increase would be directed principally toward defense programs, in part reflecting the Department's overarching mission: National Security.
- Reflecting the Administration's increasing interest in a nuclear deterrent to address state-sponsored terrorism, the request would boost Stockpile R&D by 30.8 percent to \$467 million, directing another \$725 million to Advanced Simulation and Computing, as well as \$214 million to the National Ignition facility.
- Altering course from last year, the White House would use a scalpel rather than a bludgeon in trimming FY 2003 funding for energy technology accounts. Energy Conservation would fall 10.9 percent, but Renewable Energy would climb 2.8 percent, mostly for hydrogen research associated with the FreedomCAR initiative.
- The Administration would replace the Partnership for a New Generation of Vehicles (PNGV) with FreedomCAR, which

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would emphasize the development of both hydrogen fuel cells and hydrogen delivery systems. Classified as a continuation of the DOE's partnership with the auto industry, FreedomCAR would receive \$150.3 million, a \$23.1 million increase over the funding provided for PNGV in FY 2002.

- The DOE's Office of Science programs would be focused on meeting the most compelling national priorities: developing new sources of energy, addressing the threats of terrorism and sustaining American leadership in advanced technologies. The Office of Science would essentially receive level funding, rising a scant 0.4 percent.
- The DOE's FY 2003 budget requests for the Fossil Energy, Nuclear Energy, Energy Efficiency and Renewable Energy applied research programs reflect new management approaches that emphasize "linkages to presidential priorities, market justification, cost sharing targets and market outcomes." In FY 2004, all applied research programs will be subject to these criteria, according to Department plans.

## **INTRODUCTION**

The Department of Energy (DOE) is one of the principal supporters of federal R&D. Although it ranks fourth overall in total R&D funding, behind the Department of Defense, the National Institutes of Health, and the National Aeronautics and Space Administration (NASA), it ranks first in physical science research, first in support of R&D facilities, and second in mathematics and computer science research. Above all, its research programs play an extraordinarily important role in training the next generation of scientists and engineers.

Traditionally, about half of DOE's R&D budget is allocated to federally funded research and development centers (FFRDCs), including multipurpose, specialized civilian and national weapons laboratories. These centers, long regarded as jewels in the nation's R&D enterprise, contain many large facilities, such as synchrotron light sources, neutron reactors, specialized accelerators and super computers, which are used by scientists and engineers in universities, industry, and other federal research agencies.

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The FFRDCs also provide excellent opportunities for interdisciplinary activities. Today, for example, biomedical researchers constitute more than 40 percent of the users of the synchrotron-radiation facilities, developed and maintained by accelerator physicists, optical scientists, vacuum engineers, and computer scientists.

Particle accelerators at the FFRDCs remain the focus of American high-energy physics, a research field that pushes the envelope of technology to its limits. The World-Wide-Web, for example, traces its origin to the international community of high-energy physicists, who developed the information technology to enable them to transmit graphics and data.

### **POLITICAL ENVIRONMENT**

Despite its prestigious scientific record, DOE has been a perennial target of congressional animus for a decade or more. The DOE's Capitol Hill difficulties stem partially from its unnatural birth. The Department traces its origin to 1946, when Congress established the Atomic Energy Commission (AEC) to oversee the nation's embryonic nuclear weapons and civilian nuclear reactor programs. In 1974, responding to the national energy crisis, Congress consolidated energy R&D programs housed throughout the federal government and combined them with the non-regulatory activities of the AEC to create the Energy Research and Development Administration. In 1977, when ERDA achieved Cabinet status, it was renamed the Department of Energy.

The Department has been saddled with the bureaucratic layers that accompanied its transplanted components. On the few occasions when the Department has made serious attempts to eliminate administrative redundancy, members of Congress have intervened to preserve DOE jobs in their own districts. The Department has also been stymied in its attempt to save costs by renegotiating some of the tripartite agreements among the federal, state, and local governments involved in nuclear waste cleanup. Unfortunately, the successes of DOE's stellar scientific portfolio are frequently lost in the accusatory rhetoric.

Virtually every year, the DOE R&D programs face an uphill battle during the appropriations process. The Energy and Water Development Appropriations Subcommittee is responsible for the majority of the Department's budget, and there, DOE programs must compete with water projects that are dear to the hearts of many members of Congress.

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In election years, such as this, the competition is particularly fierce. And with the federal government once again operating in a deficit mode, the challenge for DOE R&D proponents will be even greater.

Among federal agencies in which science plays a central role, the DOE is virtually unique in its organization structure. The Office of Science, which has a budget authority of \$3.3 billion in the FY 2003 request (\$3.1 billion for R&D activities), is led by a “Director” who is buried three layers below the Cabinet Secretary. So low is the appointment level, that the position remained vacant for more than thirteen months into President Bush’s term. Moreover, the Director of the Office of Science generally is the DOE’s highest-ranking presidential appointee with science or engineering credentials.

This year, Congress is poised to improve the visibility of science within the Department of Energy. The Senate energy bill, S. 517, contains language that would create a new position—an Under Secretary for Science and Energy Research. In addition to managing the research portfolio, the new Under Secretary would serve as the science advisor to the Secretary of Energy and would be required to have science or engineering credentials. The House version of the energy bill, H.R. 4, does not explicitly call for the new position but recognizes the difficulties in the present structure and calls for a study. It is widely believed that if the bills proceed to conference, the House would accept the Senate’s recommendation for a new Under Secretary.

In spite of the DOE’s tarnished image, congressional recognition of the Department’s science programs has been building slowly. Late last year, in addition to approving the creation of the Under Secretary’s position, the Senate Energy and Natural Resources Committee voted 23-0 to authorize a budget for the Office of Science that would raise its R&D funding for FY 2003 to \$3.6 billion. The authorization, which would represent a 17 percent increase, had assumed that the FY 2002 Office of Science budget would increase by at least 8 percent, as had been rumored during the appropriations conference. The September 11 attack and the consequential reordering of priorities trimmed that number to 2.1 percent. Still, the bipartisan support expressed by the authorizers suggests that DOE’s science portfolio is beginning to attract significant congressional support.

## FUNDING REQUEST AND PRIORITIES

**Overview:** Last year, Congress significantly rewrote the presidential budget request for the DOE's R&D programs. This year, with presidential requests for cuts to energy technology programs more tempered, the rewriting is likely to be less drastic. Last year, the Department sought increases only for programs that met the test of the greatest immediacy, with Atomic Defense R&D leading the way. This year, the presidential budget again identifies the weapons programs contained within the National Nuclear Security Administration (NNSA) as high priority budgetary items. (For details of R&D in the DOE request, please see Table II-11; the second part of Table II-11 contains details of the overall DOE budget.)

The presidential budget request would add \$23.1 million to a technology partnership with the auto industry, an 18.1 percent increase. But in a controversial move, the Administration would replace the Partnership for a New Generation of Vehicles (PNGV) with the FreedomCAR program, which has a long-term goal of developing a transportation system based on hydrogen technologies. Supporters of the change hail the move as forward-looking and a welcome abandonment of the electric car program, which they claim has stalled badly and is dated. Detractors assert that the FreedomCAR technology is so futuristic that it will do little to reduce petroleum consumption and green house gas emission for many decades.

Although it would hold the Office of Science budget to a 0.4 percent increase, the DOE request would increase funding substantially for many of the Office's programs, including Nuclear Physics, Materials Sciences, Chemical and Geosciences, Advanced Scientific Computing, Life Sciences, and Environmental Processes. To do so, the Administration would eliminate almost \$70 million in congressional earmarks that populate the FY 2002 appropriation for Biological and Environmental Research (BER). Many of those earmarks are likely to reappear by the time Congress concludes the FY 2003 appropriations process. And if the Office of Science bottom line remains fixed at the presidential level, the proposed gains will be illusory.

**Energy Supply:** Boosted by a 36.6 percent increase for hydrogen research, Renewable Energy R&D would climb by 2.8 percent (see Table II-11). Biomass, Geothermal Technologies and Solar Energy

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would all decline by 2 to 3 percent. Wind Energy Systems would receive a 14.0 percent increase to develop low-wind technologies. Overall, Nuclear Energy R&D would decline 34.3 percent to \$63 million, with much of that decline attributable to cuts in spent-fuel processing research and the Nuclear Energy Research Initiative (NERI). The NERI program, which funds peer-reviewed R&D at universities, national laboratories and industry, was originally established to encourage more students to enter the depleted ranks of nuclear engineering. The Administration proposes to phase out the program. By contrast, the DOE request would boost Nuclear Energy Technologies by more than 30 percent.

**Science:** The Science account's largest R&D program, Basic Energy Sciences (BES), would continue to dominate the portfolio. Although it would receive an increase of only 2.0 percent, its core programs would grow by much more, as the Spallation Neutron Source construction program begins to wind down. Materials Sciences would grow by 6.9 percent and Chemical and Geosciences by 5.9 percent. Total BES R&D would break through the billion-dollar barrier, reaching \$1.02 billion.

High-Energy Physics, the second largest Science program at \$725 million, technically would receive a boost of 1.7 percent. But, almost all of the \$12.0 million increase would go to the Large Hadron Collider (LHC) project in Geneva, Switzerland. The additional \$11.0 million LHC allocation simply represents a deferred payment on funding that was withheld last year by agreement with CERN, the host laboratory. To fund Neutrinos at the Main Injector (NuMI), a FermiLab construction project, and still keep the High-Energy budget frozen, DOE would terminate high-energy physics operations at Brookhaven National Laboratory, as previously planned, and maintain the Stanford Linear Accelerator's budget essentially at the FY 2002 level. The DOE request would add \$8.7 million to NuMI and \$2.5 million to university research programs.

Nuclear Physics would see its budget jump by 6.5 percent to \$382 million, largely to achieve greater utilization of two large accelerators, the Brookhaven Relativistic Heavy Ion Collider (RHIC) and the Thomas Jefferson National Accelerator Facility (TJNF). Operations at RHIC would increase from 11 weeks to 22 weeks and at TJNF from 26 weeks to 28 weeks. Operations at the MIT-Bates Linear Accelerator Center would also increase from 21 weeks to 27 weeks. As in the case of High-

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Energy Physics, Nuclear Physics university research programs would get a modest \$3.9 million boost.

Fusion Energy Sciences would climb 4.0 percent, largely to allow increased facilities operations at the DIII-D (14 weeks to 21 weeks), Alcator C-Mod (8 weeks to 21 weeks) and NSTX (12 weeks to 21 weeks).

The 7.8 percent increase for Advanced Scientific Computing Research (ASCR) to \$170 million would be devoted principally to computational biology and computational nanoscience.

Biological and Environmental Research (BER), the third largest Science program, would receive \$504.2 million. But the proposed 11.6 percent cut almost exclusively reflects the elimination of \$69.8 million in congressional earmarks that appeared in the FY 2002 Medical Applications appropriations. The Department would continue to focus more resources on the Genomes to Life program, almost doubling its funding for a second consecutive year to a total of \$36.7 million. The Human Genome program, which DOE originated well before it was on NIH's radar screen, would rise by 2.6 percent to \$90.2 million.

***Fossil Energy and Energy Conservation:*** These are the only two R&D programs within DOE that receive their funding through the Interior and Related Agencies Appropriations Bill. Almost all Fossil Energy activities would see major reductions, with cuts ranging from 15 to 50 percent. Not even the President's Coal Research Initiative escapes the trimming knife, although its reduction would be only 3.8 percent. But Carbon Sequestration R&D would break the trend with a proposed 67.7 percent hike. The increase is consistent with the Administration's pledge to increase research funding on climate change. The Administration would also follow through on another of its policy decisions, cutting Energy Conservation accounts by 10.9 percent, consistent with its position that developing new energy supplies should take precedence over other alternatives.

***Atomic Energy Defense Activities—National Nuclear Security Administration (NNSA):*** Defense represents the largest portion of the DOE R&D portfolio and this year, it is again the primary focus. Maintaining the nuclear stockpile as a safe, secure and reliable weapons system has been a major challenge for DOE, since the U.S. ceased

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testing nuclear weapons more than a decade ago. To meet the challenge, DOE has developed the Stockpile Stewardship program, the largest component of its Defense R&D portfolio. Congressional support for this program should remain relatively strong. The Department's requested increase of 30.8 percent (to \$467 million) reflects both the popularity of the program and the Administration's view that the nuclear option should remain on the table to confront state-sponsored terrorism.

The Advanced Simulation and Computing program, formerly the Accelerated Strategic Computing Initiative (ASCI), provides three-dimensional simulations of nuclear weapons behavior, which would be tested against controlled fusion experiments. The experiments would be carried out using two facilities: the Dual-Axis Radiographic Hydrodynamic Test Facility (DAHRT) and the National Ignition Facility (NIF), which is still under construction. The FY 2003 budget would hold Advanced Simulation and Computing close to the FY 2002 funding level and would reduce NIF construction money by \$30.9 million to \$214.1 million, as planned. The Administration would also reduce spending on High Energy Density Physics (formerly the Inertial Confinement Fusion and High Yield Campaign) by 11.4 percent, mostly by cutting funding for diagnostics and experiments at NIF, which is not scheduled for completion until close to the end of the decade.

The Administration's request of a 9.6 percent cut in Nonproliferation and Verification R&D primarily reflects the completion of the Nonproliferation and International Security Center. The budget request notes that the FY 2002 supplemental appropriation had already pumped in significant money for nonproliferation activities deemed particularly urgent after September 11 terrorist attacks. Consistent with these needs, the Nonproliferation R&D programs proposed for the FY 2003 budget would emphasize "efforts that will produce direct near-term application that can be fielded in two years or less."

***Radioactive Waste Management:*** The Department has responsibility for managing and disposing of the nation's spent nuclear fuel and high-level radioactive waste, both civilian and military. The relatively small R&D program would increase by 5.7 percent to \$64 million.